





#### mCare:

# Development, Deployment and Evaluation of a Mobile Telephony-based Patient Secure Messaging System

**Project Overview** 

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#### mCare Project Overview

#### What it is:

- ✓ Synchronization over distance of:
  - mTBI patients
  - Other Wounded Warriors
  - Military care team members
- ✓ Uses patients' <u>EXISTING</u> cell phones
- ✓ Secure, HIPAA compliant messaging
- Simple patient responses (typically 1 character or one click)
- Care team leverages a website to access information

#### What it is <u>not</u>:

- Issuing soldiers cell phones
- Expecting patients to perform complicated technology tasks
- Text messaging (SMS) of PII or PHI
- Expecting care team members to "text message" the patient

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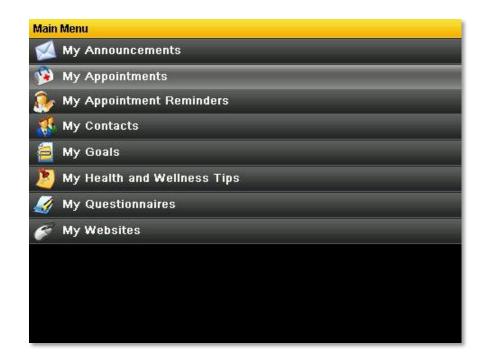
#### mCare at a Glance





#### mCare Main Menu

- The mCare phone menu has multiple options, this is a direct result of patient feedback
- Some menus are static, and will always appear on the device (i.e. My Appointments, My Contacts, My Goals, My Websites).
- Other menus will only appear as specific messages are sent to the phone (i.e. My Announcements, My Appointment Reminders, My Health and Wellness Tips, My Questionnaires)



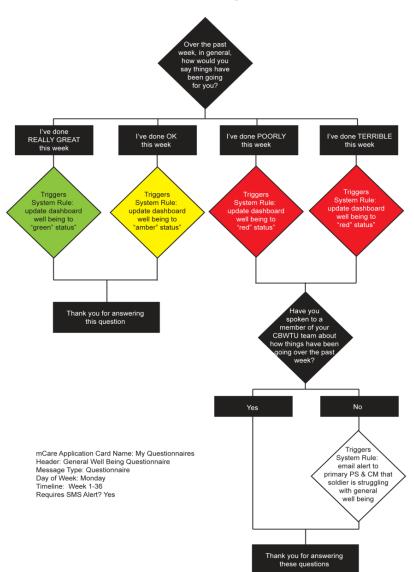




#### mCare Questionnaire Logic



mCare: General Well Being Questionnaire

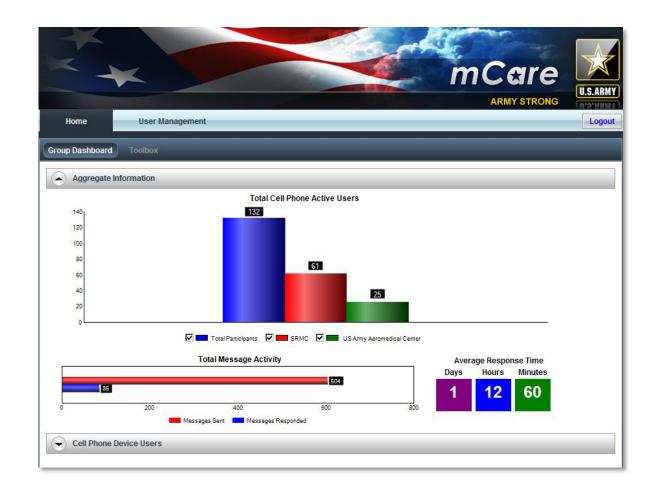






#### mCare Dashboard

- Dashboard will be slightly different depending on user role:
  - Local (Unit) Accounts
  - Regional Accounts
  - Global Accounts

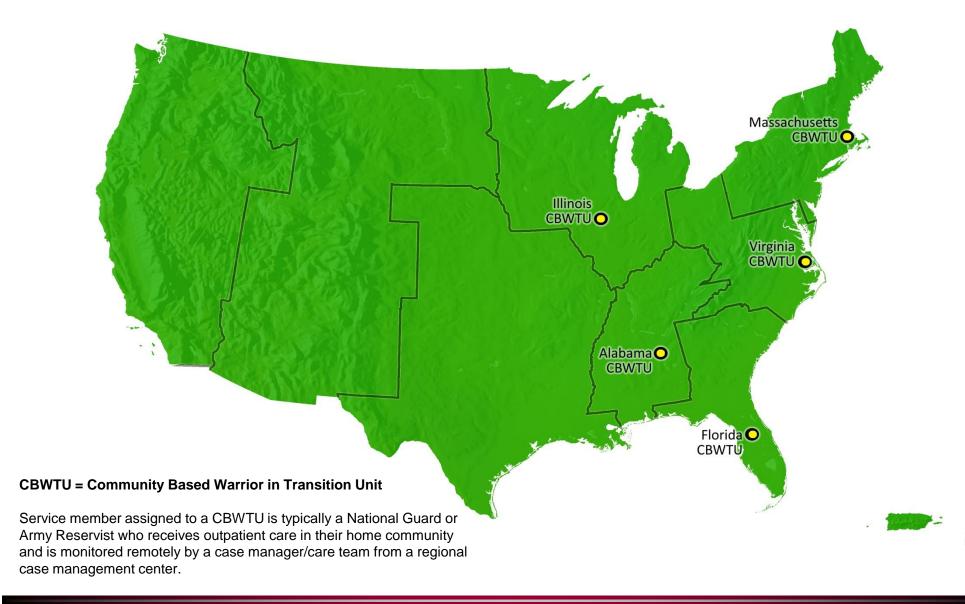








#### mCare Sites and Regions







#### **Problem to be Solved**

- CBWTU case load can reach up to 50 patients per team member
- These units are required (by regulation) to make contact with patients:
  - Platoon Sergeants make daily contact (M-F)
  - Case Managers make weekly contact
- If any patient is in crisis for any reason, finding the time to reach others on a daily basis is very challenging
  - OEF/OIF patients with significant physical injuries may not manifest other conditions such as mild TBI and PTSD until they return to their home environment
- Patients receive care in non-DoD facilities, which can be difficult to monitor remotely without timely access clinical notes or external EMRs
  - Makes it difficult to prompt a patient with memory issues about their next appointment if the care team does not have access to the information







## mCare Project Objectives

- Provide a means to keep in contact with all patients remotely, meeting or exceeding contact rates set by Army regulation.
- Allow CBWTU care team members to review patient's mCare activity and "triage" phone contact accordingly
- Provide a means to automatically, remind patients of upcoming appointments and remind their non-DoD facilities to fax clinical notes to the case manager
- Provide an opportunity for patients to self-report follow-up appointments in non-DoD facilities to their care manager through their person cell phone.
- Conduct all these activities in a secure fashion with upmost care to patient privacy through the patient's personal cell phone, regardless of wireless carrier or handset model.
- Conduct project with a minimum of 100 volunteer patients, and then migrate to a formal research study with enrollment up to 400 patients





#### mCare Project Solution

- Secure phone application
- Secure website for clinical user access
- Dedicated staff members at each site to assist with training, installation and administrative workload related to the use of mCare







#### **Personal Cell Phones**

- Patient shouldn't be issued a new device, is more likely to leverage an application that works on their preferred mobile phone
- Should work on largest variety possible of phones in commercial market
  - Feature phones
  - Smart phones
- Application should be easy to install and remove remotely
- Application should prevent others from accessing information if the phone is unattended
- Application should be intuitive to use
- Application needs to be robust enough so the patient finds value in accessing it routinely







#### mCare Website

- No "cell phone" skills required
- Care team uses a web site to enroll, assign and view results
  - Leverage a secure web portal within the DoD network
- Must have significant useful content available to care team to motivate them to access the system
- Leadership tools for tracking cumulative data







#### mCare Team

- mCare team staffing plan includes a project liaison for each location.
  - Registered Nurse
  - Works as a peer to case managers, social workers and unit staff
  - Assumes workload of enrolling and assigning messages
  - Engages and trains staff as they adjust and adopt system
- Single Project Officer who oversees and coordinates Project Liaison activities at all mCare sites
- Dedicated IT team member to assist with troubleshooting and monitor system services
- Wide variety of SMEs and consultants available for specific aspects of the project







### **Project Timeline**

2008	2009			
4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter

mCare Kick-Off Meeting (11-12 Dec 2008) mCare Platform Development
(4.5 months)

Testing

**mCare Active Enrollment** 



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#### Implementation Strategy

- Command Briefings
- Site Visits/Needs Assessments
- Workshops/Training Sessions
- Weekly Meetings
- Monthly Newsletter / Tri-folds / Social Networking
- User Feedback to Guide Policies
- Conduct Focus Groups
- Wireless Carriers/Application Centers (iPhone/Android)







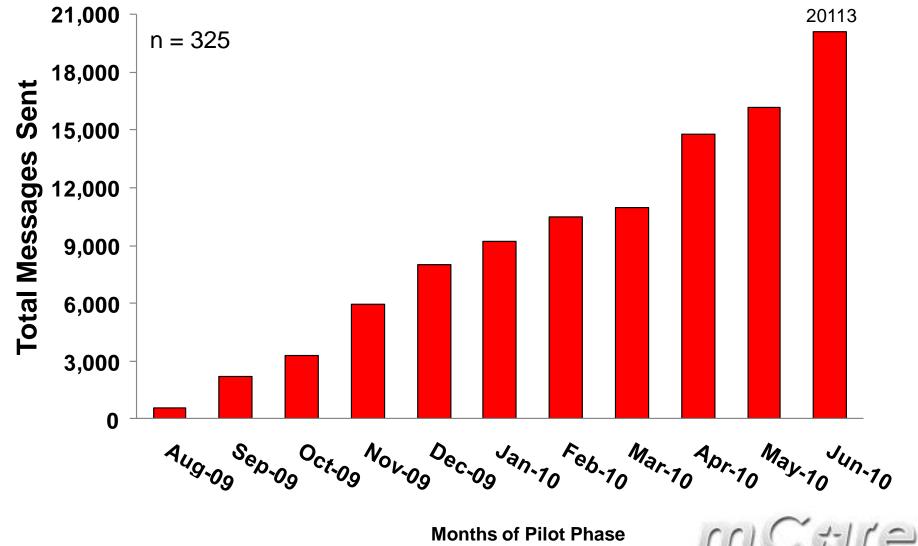
#### **General Lessons Learned**

- mHealth is not a hard "sell"
- Wide acceptance by patient population
  - Patients have voluntarily upgraded their personal phones to participate in the pilot project
  - Demand for additional features within mCare outstrips the development cycle
  - No perceptible age or gender gap to adoption
- Care team members are actively approaching mCare Project Liaison to enroll patients
  - Project Liaisons are considered part of the team at each site
- Website appointment tracking tools for non-DoD in website are serving as model for all CBWTU patient tracking in the North Atlantic Region







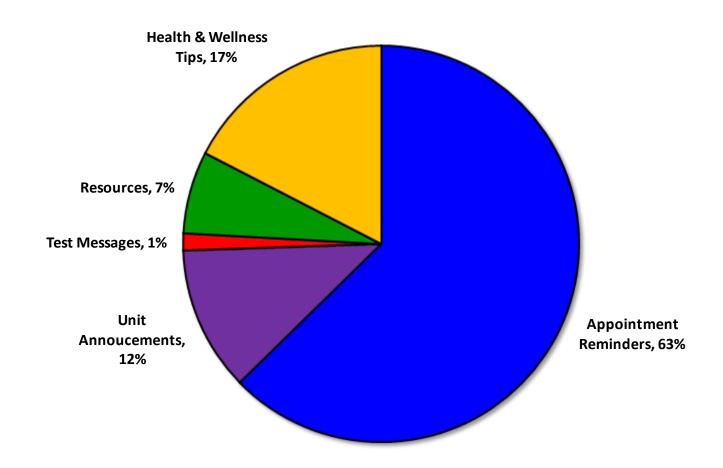








#### **mCare Content**









#### mCare Cell Phone Users, By State



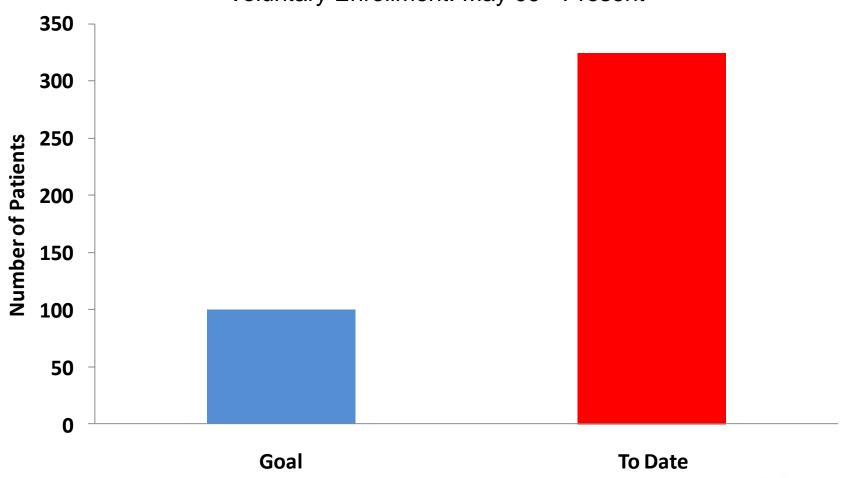






#### **mCare Patient Users**

Voluntary Enrollment: May 09 - Present

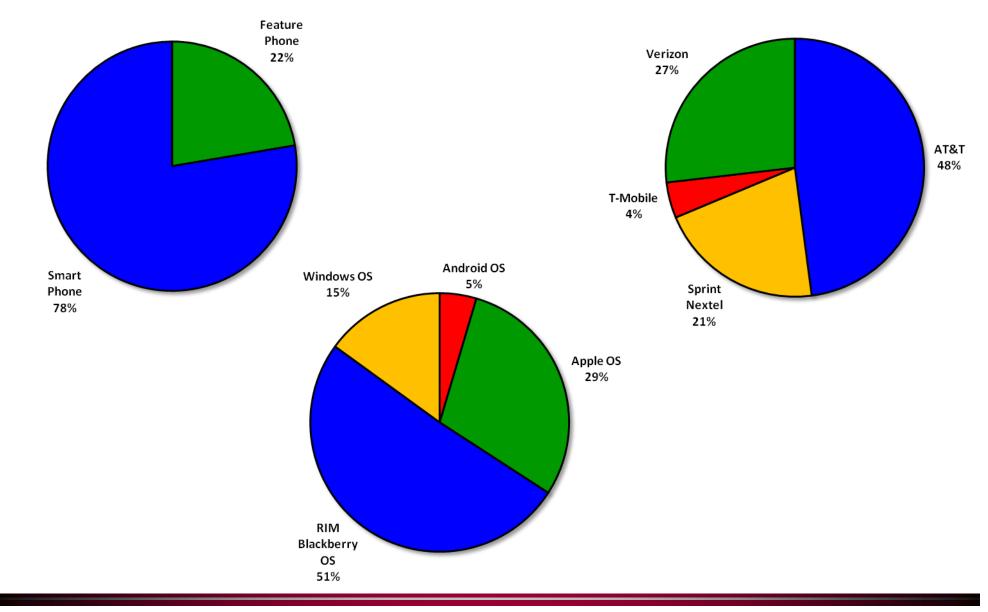








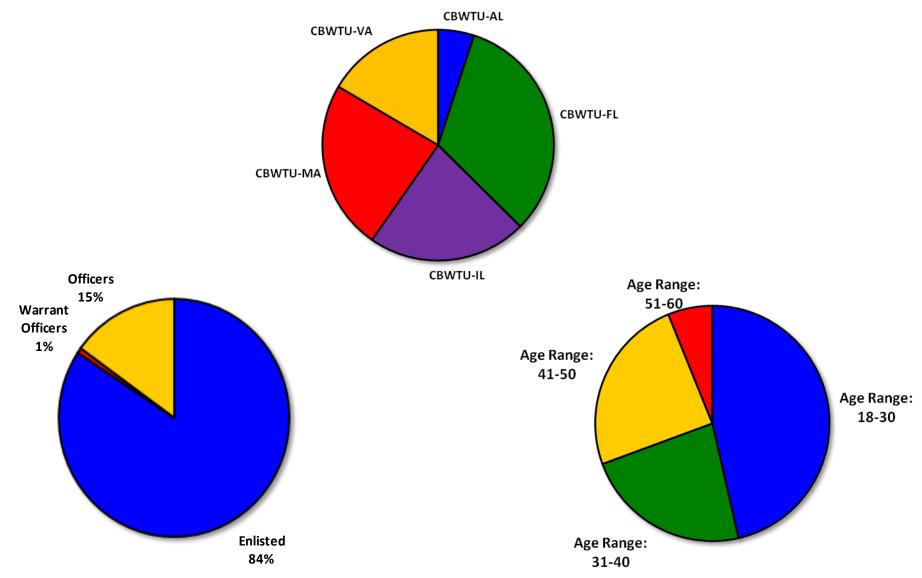








#### mCare Users







### **Focus Group Results**

#### **Patient Statements**

- "I really like it when the appointment reminders pop up. I am working and I tend to really delve into what I'm doing and so I like getting the realtime reminders to quit what I'm doing and go to my appointment"
- "I wish mCare could be used to provide me more real-time information/feedback regarding the status of my medical board process. This would be very helpful."
- "It's great when I'm traveling because it provides an instant connection. It's kind of liberating because you always have it with you. I think this is critical, especially for the Guard being spread out."
- "mCare is more convenient than email because email comes in a bundle and you have to sort the messages. With mCare it more targeted: It comes up and you know immediately it's from the CBWTU."

#### **CBTWU Care Team Statements**

- "mCare provides the assurance/certainty that the soldier is getting the needed reminders."
- "This certainty gives the team a better way for monitoring patterns of behavior, which could be helpful in the medical board process. mCare allows the team to assess the patient's situation with a little more detail."
- "Before mCare, the Platoon Sergeant had to call the soldier everyday for 2 weeks because the soldier wasn't calling-in as he was supposed to.

  mCare has helped put that responsibility on the soldier."







#### Impact of mCare

"It prevents you from feeling alone; it just tells me I'm in contact. This is a hard process and I know that I have issues that won't ever get fully resolved. But mCare is just comforting. When the messages pop-up, you know someone's there."









#### mCare:

# Development, Deployment and Evaluation of a Mobile Telephony-based Patient Secure Messaging System

mCare Deployment

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11 August 2010





#### **Disclaimer**

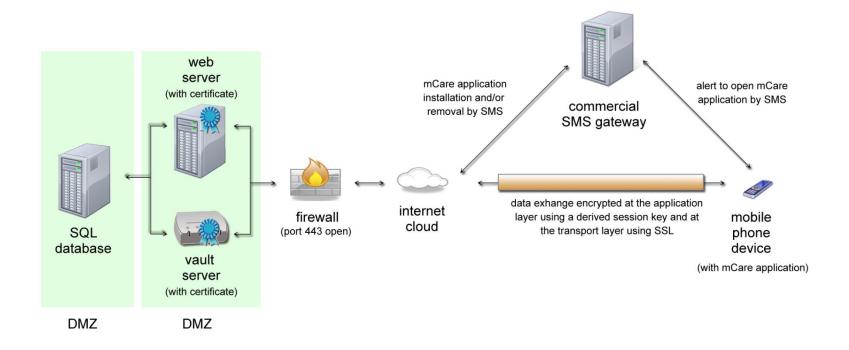
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#### mCare IT Structure Summary







## mCare Technical Requirements



- Major US Wireless Carrier (AT&T, T-Mobile, Sprint Nextel and/or Verizon)
- Screen Display of 176 x 200 or larger
- Text messaging (SMS) services
- Data service
  - Required to securely transmit PII/PHI via SSL to mobile device
  - Can be a limitation to enrollment





# mCare Text Message Alerts



- The patient interaction begins when he/she receives an SMS (text message) alert.
- This alert allows the cell phone user to know there is new information available in the mCare application, but does not reveal any specifics that might violate privacy considerations.
- The text message alert is also specific as to what section of the mCare phone application contains the new information, as shown

*△* 41782

Jan 8, 2010 11:42:14 AM A new My Announcements message has been assigned to you. Please launch the mCare application to view this new message.

**△41782** 

Jan 11, 2010 1:09:45 PM
A new My Appointment
Reminders message has been
assigned to you. Please launch
the mCare application to view
this new message.

△ 41782

Jan 8, 2010 11:40:21 AM A new My Questionnaires message has been assigned to you. Please launch the mCare application to view this new message.

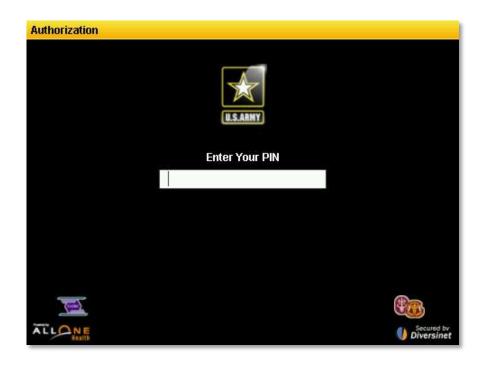






#### mCare Login

- To access the mCare application, the patient must enter a 6-digit PIN code. This PIN code is set by the cell phone user, and is not known to anyone else.
- If the patient forgets what his/her PIN code is, the site's project liaison can issue a one time activation code that allows the user to reset their PIN.
- The PIN code, along with security certificates installed on the phone provide the 2-factor authentication needed to ensure privacy.



NOTE: If the patient upgrades their phone, or loses their device, the application can be removed remotely from the phone to further ensure the highest security standards







### **My Appointments**

- The My Appointments menu on the cell phone will display all the CONFIRMED appointments that have been entered into the mCare website.
- An appointment entry can only be confirmed by a member of the CBWTU team.
- The My Appointments section also allows the patient to enter a new appointment into his/her phone application.
- This information will transmit back to the mCare website, where a member of the care team at the unit level can confirm the event.
- Once confirmed, the information will display on the patients list of upcoming appointments as a continual reference.



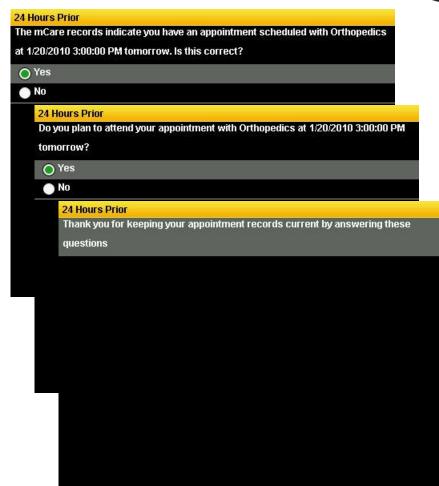






#### **Appointment Reminders**

- Appointment reminders are sent to the patient's phone 24 hours & 90 minutes before a confirmed appointment
- These messages are scheduled automatically by the system, and the only action required by the care team is to confirm the appointment entry through the website.
- Step 1: The patient receives a text message alert
- Step 2: The patient opens his/her appointment reminder in mCare, and answers questions
- These responses are returned to the mCare website, and when applicable members of the unit care team are notified of changes or intent to no-show by email alerts to login to the website







## My Contacts



- My Contacts is an example static menu item, it will always appear on the patient's phone application.
- It will display the patients primary and secondary case manager, primary and secondary platoon sergeant, and social worker assignment(s).
- By selecting any unit members name, the email address, phone number and fax number will display on the patient's phone.

```
Jeanette Rasche

Primary Case Mgr: Ronald Jones

Secondary Case Mgr: Sally Smith

Primary Platoon Sgt: Jeffrey Little

Secondary Platoon Sgt: Henry Rodriquez

Primary Social Worker: Jennifer Jefferson

Secondary Social Worker: Jeanette D Rasche
```







### My Health and Wellness Tips

- The Health and Wellness Tips section will contain information from validated sources, including After Deployment.com and the Alabama Reintegration Plan.
- These tips can include an acknowledgement when required, but those populated in the mCare library to date do not, as this information is intended to be a resource, and is not as time sensitive as an appointment reminder.
- Assignment of Health and Wellness Tips may be highly variable. Lessons learned have shown that these messages are very appealing to some patients, and distracting or annoying to others.
- NOTE: Decisions regarding the assignment of these tips for specific service members will be made at the unit level.



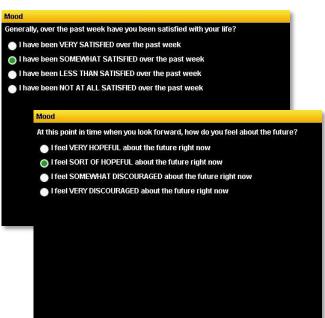


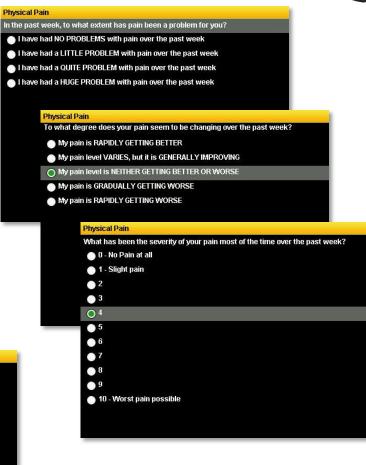




#### My Questionnaires

- This tool allows the mCare project to push multi-part questionnaires to patients on a variety of subject ranging from General Wellbeing to Mood and Pain Levels, and is part of the research study.
- Patient responses will be recorded on a graphical interface on the mCare website.











#### **mCare Website**

	mCare  ARMY STRONG  U.S.ARMY
Sign in with your mCare application credentials  mCare User ID Password Sign In	Welcome to mCare Secured Website.  To continue, you must be a registered user of the mCare application. You must have the correct credentials to go beyond this point.  If you have forgotten your credentials please contact your site's mCare Project Liaison or the mCare System Administrator,  Mr. Kurt Huttar







#### Message Feedback

- Message status broken down by type
- Shows a red, amber or green icon to indicate status
  - Red message has left server by not yet reached phone
  - Amber message has reached phone
  - Green message response has returned to server from phone
- NOTE: Not all messages have a response, so those will never display higher than amber









#### mCare Dashboard

Home User Management		Logout
Group Dashboard Toolbox		_
Soldier Dashboard	Cell Phone Device User Dashboard	: Buchholz, George
Soldier Dashboard		
Wellbeing / CTP / Weight	Physical Pain	Questionnaires
General Well Being	Extent of Pain	
Comprehensive Transition Goal Plan	Severity of Pain	Appointments
Monthly Weight	Change in Pain Levels	0.6.4.1.4.11
	Impact of Daily Activities	Scheduled Messages
		Goals
Mood	Anger Management	
Life Satisfaction	Temper Control ■	Notes
Good Spirits	Anger Interfering at Work	Message Activity
Future Outlook	Anger Interfering at Home	Wessage Activity
		Phone Load
Relationships	Energy and Sleep	
Getting Along with Family and Spouse	Energy Level	
Getting Along at Work	Energy Daily Activities	
Impact on Work	Sleeping	
	Hours of Sleep	
Legend		
critical status requiring immediate action  poor or unacceptable status that will require follow-up	▲ improvement since last reported     ▼ decline since last reported	
marginal status that will require monitoring		
good or acceptable status		

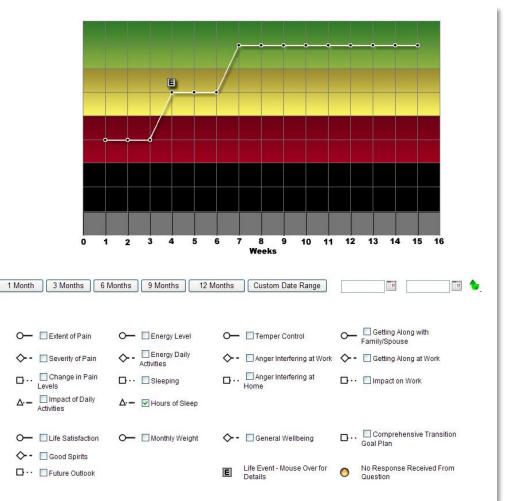






#### **Graphical Feedback**

- Graphs are source of trend data for the research study
- Can display a single element, and then customized with menu below the graph
- Will include concurrent events, or notes, when entered for a specific cell phone user.









#### **Phone Meters**

- Phone capacity for each category is 20 messages
- When 21<sup>st</sup> message is sent to phone, the oldest message is automatically deleted
- This view allows staff and care team members to anticipate this overflow









#### mCare Toolbox









# **Creating Messages in mCare**

37				OH 14 C				
				are	U.S.ARMY			
Home User Management			AF	RMY STRON	Logout			
Group Dashboard Toolbox	_	_	_	_				
pisplay Health and Wellness Tips Add Health and Wellness	s Tip							
Health and Wellness Tips								
▲ Drafts								
▲ Final (locked)								
Title Header	<u>Schedule</u>	<u>Author</u>	<u>Site</u>					
I Gobal: mCare Phase 1: Holiday Stress Dealing w/Holiday 01 Stress	03: 12/22/09-8AM EST Once	Rasche, Jeanette	-		chedule <u>Assign</u> eactivate			
Gobal: mCare Phase 1: Holiday Stress Dealing w/Holiday 1 Stress	03: 12/22/09-12PM EST Once	Rasche, Jeanette		Copy So	chedule Assign eactivate			
Gobal: mCare Phase 1: Holiday Stress Dealing w/Holiday	03: 12/22/09-1PM EST	Rasche,	-	Copy So	chedule Assign eactivate			
Gobal: mCare Phase 1: Holiday Stress On Holidays Seek	Once 03: 01/07/10 - 10AM EST Once	Jeanette Display I	Health and Wellnes	_	d Health and Wellness Tip			
2 Support Gobal: mCare Phase 1: Holiday Stress Be Realistic on	Office	100000000000000000000000000000000000000	- Carlotte Colors and					
03 Holidays I Gobal: mCare Phase 1: Holiday Stress Budgeting for Holidays		Health	and Wellness	Tips: Ad	d New H/W Tip		(2)	
				Title:		(50 char max)	, all	
Gobal: mCare Phase 1: Holiday Stress Planning for Holidays				Header:				
Gobal: mCare Phase 1; Holiday Stress Learning to Say No	03: 01/04/10 - 3PM EST Once			Message:		(30 char max)		
Gobal: mCare Phase 1: Holiday Stress Healthy Holiday Habits								
I Gobal: mCare Phase 1: Holiday Stress Holiday Rush-Take a Break								
Global: mCare Phase 1: Health Tip 01 Improving Relationships								
Global: mCare Phase 1: Health Tip 02 Dealing with Depression	03: 01/12/10 - 3PM EST Once					w.		
259,5331011	,==				(Maximum characters: 230)			
					You have 230 characters left.			
			Require acknow	dodaement				
			Require acknow	neugement.				
			Send Comp	oanion SMS:				
					Save Draft S	ave & Lock	Cancel	





# **Scheduling Messages**

Scheduler: Schedule						
Scheduler: Schedule Name 12/22/09 10:00 AM EST		Time	10:00 09:00 09:30	Zone	Eastern Standard Time	~
Schedule Recurrence:  Daily Weekly Monthly	Every 1     Every weekday	day(s)	10:00 10:30 11:00 11:30 12:00			
Date Range Start: 12/22/2009		O No End Date  End after: 1 occurrences  End by:	12:30 13:00 13:30 14:00 14:30 15:00 15:30			
		Create Schedule	16:00 16:30 17:00 17:30 18:00			

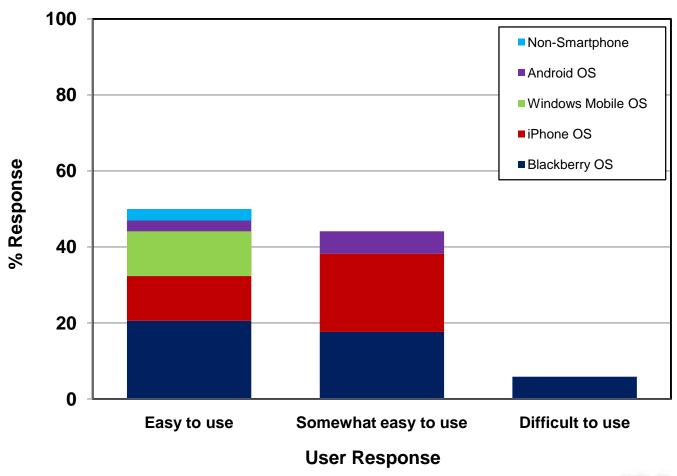






# **Survey Results**

Greater than 90% of Users found mCare Easy to Use or Somewhat Easy to Use

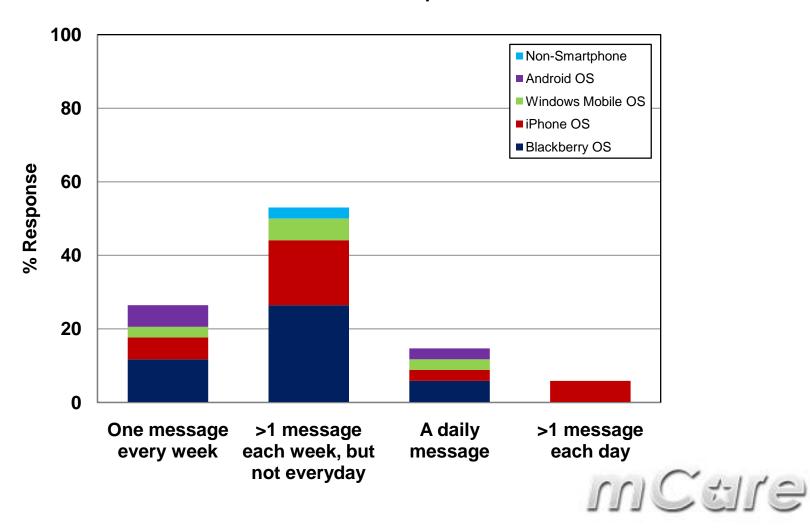






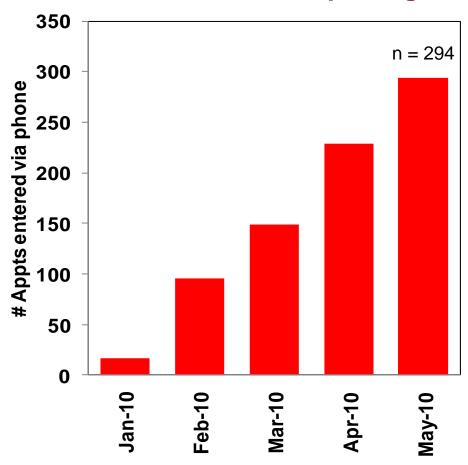
## **Survey Results**

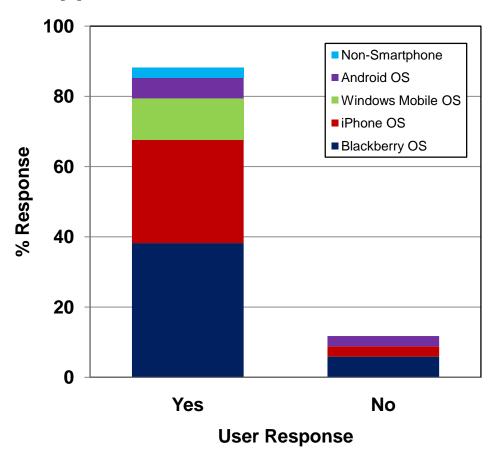
Nearly 75% of responders preferred multiple resources, health & wellness tips, and announcements per week





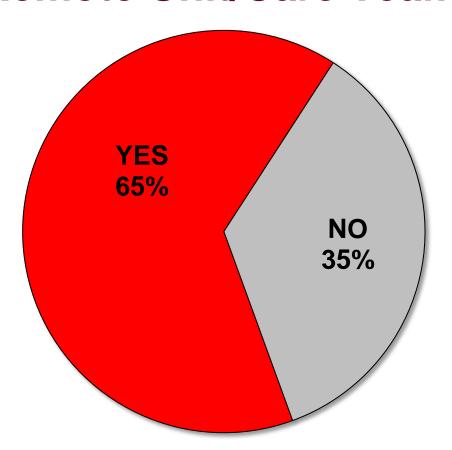
#### **Cumulative Reporting of New Appointments via Phone**







# mCare Improved Communications with Remote Unit/Care Team











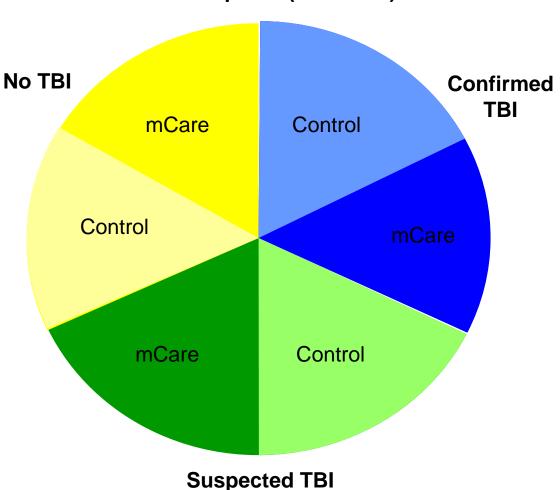
Objective	Measurement	Expected Benefit
Increasing contact rates	Contact rates assessment btw SM, CM and PS	Improvement contact rates
Satisfaction with CM Care	Management Quality Assessment	Increased communication = increased satisfaction
Appointment attendance rates	Rates of verified appointment attendance	Decreased no-show rates
Well-being/ Neurobehavioral	General Well-Being Schedule Neurobehavioral symptom Inventory	Evaluation of current symptoms
Goal awareness	Comprehensive Transition Plan assessment	Accurate goal awareness
System performance	System analysis	Prioritization of features required
System utilization – Service Member	System analysis	System is functional and reliable
System utilization – Case Manager/Platoon Sergeant	System analysis	System is functional and reliable
User Satisfaction – Service Member	Focus group evaluation SUS technology assessment	Acceptability of system
User Satisfaction – Case Manager/Platoon Sergeant	Focus group evaluation SUS technology assessment	Acceptability of system
	Increasing contact rates  Satisfaction with CM Care  Appointment attendance rates  Well-being/ Neurobehavioral  Goal awareness  System performance  System utilization – Service Member  System utilization – Case Manager/Platoon  User Satisfaction – Service Member	Increasing contact rates  Contact rates assessment btw SM, CM and PS  Satisfaction with CM Care  Management Quality Assessment  Appointment attendance rates  Rates of verified appointment attendance  Well-being/ Neurobehavioral  General Well-Being Schedule Neurobehavioral symptom Inventory  Goal awareness  Comprehensive Transition Plan assessment  System performance  System analysis  System utilization – Service Member  System analysis  System utilization – Case Manager/Platoon Sergeant  User Satisfaction – Service Member  Focus group evaluation  SUS technology assessment  Focus group evaluation  Focus group evaluation



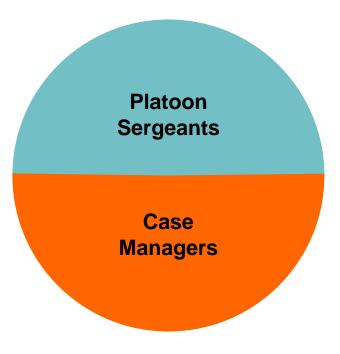


## **Research Study Population**





#### **Cadre Participants (by site)**

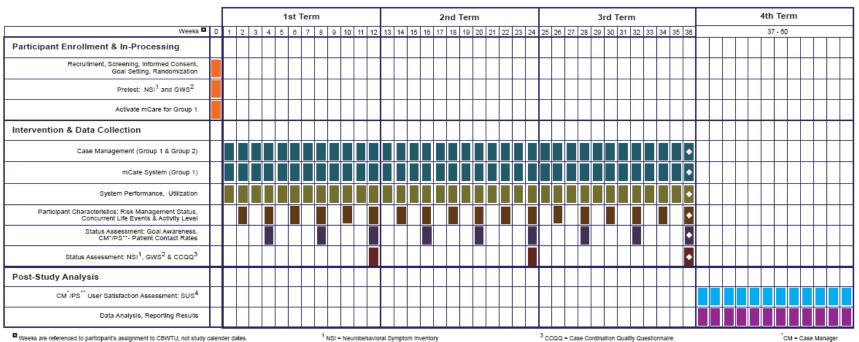








#### **Research Study Data Collection Timeline**



Weeks are referenced to participant's assignment to CBWTU, not study calender dates Data collected at week 36 is considered Post-test

In-Processing: NSI, GWS

Every 2 weeks: Activity Level (Appointments, Work), Concurrent Life Events, Risk Status

Every 4 weeks: GAA, Contact Rates

Every 12 weeks: NSI, GWS, CMQQ

Week 36: Post-study Feedback



<sup>&</sup>lt;sup>2</sup> GWS - General Well Being Schedule

<sup>&</sup>lt;sup>4</sup> SUS - System Usability Scale

CM - Case Manager PS = Platoon Sergeant







- LTC Lynne Lowe
- COL Eileen McGonagle
- Dr. Fran McVeigh
- COL Ron Poropatich
- Dr. Johnie Tillman

- Mabel Cooper
- Cindy Gilley
- Lois Goldstein
- Kurt Huttar
- Bonnie Strickland
- Celicia Thomas



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# **Project Vendor Acknowledgements**

- AllOne Health, Inc.
- Diversinet
- Medical College of Georgia Department of Biostatistics
- Sister Kenny Research Center



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